

serve as the basis for more research, for more thoughtful and meaningful discussion of plans by public and private agencies, and for the establishment of clearer social goals.

Our exploration of the question of alternatives for electrical energy generation began in 1972 at Earth Metabolic Design, Inc. (EMD), a nonprofit research organization concerned with prudent resource planning. At that time Medard Gabel, EMD's director, organized a project to assess the potential of using renewable energy sources on a global scale. The project is described in his book *Energy, Earth and Everyone*. Numerous subsequent research and planning projects conducted by private and government agencies provided opportunities for expanding our thoughts on the topic. Thus, this book is largely the result of ten years of research in alternative energy systems and of a conference entitled, "The Problems and Potentials of Decentralizing Electrical Production," held at Wesleyan University (Middletown, Connecticut) in April 1978. The one-day symposium was sponsored by the College of Science in Society at Wesleyan, and by EMD, Northeast Utilities, the Connecticut State Energy Office, and the New England Regional Office of the Department of Energy. Some of the speakers have contributed articles to this book.

The conference literature set forth the following questions to be addressed:

Can significant amounts of electricity be produced from small-scale renewable sources such as wind, photovoltaics, cogeneration, and hydroelectric?
How much?
Have these systems proved themselves? Are they reliable?
Can they compete economically with fossil and nuclear fuels?
What are appropriate scales of production?
What kinds of institutional changes would be required?
What kinds of technological changes would be required?
Can electricity be produced in competitive markets by small producers?
Can continuous supply be assured? Can quality be assured?
How would the system be managed? What role would utilities play?
Would decentralized systems save money? Would they pollute more or less?
How would electrical power be stored?

Since the conference we have added some more critical questions:

What is "appropriate" technology regarding electrical generation?
To what extent can wind supply this country with electricity? Hydroelectric power? Cogeneration? Photovoltaics? Solid waste?
Can other sources such as hydrogen and fuel cells supply a sufficient amount of electricity?
How could a diversified grid be decentralized, integrated, and managed?
How can past experience guide us?
Are there diseconomies of scale of electrical production?
What impacts on employment would a decentralized system have?
How can such a system be implemented?

**DECENTRALIZING
ELECTRICITY
PRODUCTION**

DECENTRALIZING ELECTRICITY PRODUCTION

HOWARD J. BROWN, Editor
with Tom Richard Strumolo

Yale University Press
NEW HAVEN AND LONDON

363.62
D292
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Published with assistance from the Kingsley Trust
Association Publication Fund established by the
Scroll and Key Society of Yale College.

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Designed by James J. Johnson

and set in Melior Roman type by

P & M Typesetting, Inc.

Printed in the United States of America by

Halliday Lithograph, West Hanover, Massachusetts.

Library of Congress Cataloging in Publication Data

Main entry under title:

Decentralizing electricity production.

Includes index.

1. Electric power production—Addresses, essays,
lectures. I. Brown, Howard J., 1945—

II. Strumolo, Tom Richard, 1952—

TK1005.D38 1983 363.6'2 83-3677

ISBN 0-300-02569-6

10 9 8 7 6 5 4 3 2 1

To R. Buckminster Fuller, whose ideas,
lifetime work, and belief in individual
initiative provide the inspiration to
"dare to be naive."

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Preface and Acknowledgments

This is a book about the future, yet it includes no forecasts or predictions. Our motivation to prepare the book did not result from a curiosity about what is *likely* to happen but from an exploration of what *could* happen. As planners involved in energy issues daily, we began with the belief that energy—the way we produce, distribute, and use it—is at the heart of every social, economic, and environmental problem confronting society; and that energy policies and decisions based on projections and forecasts derived from recent trends can only encourage more of what we are already doing. It seems self-evident that if there is one thing we do not need, it is more of what we already have.

Fossil and nuclear fuel shortages, health and safety problems, inflationary pressures, environmental impacts, and financial problems are threatening the viability of our electrical energy system. Many people who are involved with these issues have come to feel that the problems inherent in the way society produces and distributes electricity are so serious that major changes are in order. But it is the responsibility of citizens who disagree with the status quo to propose alternatives, and that is what this book is about. Nevertheless, we do not presume that it contains answers, only possibilities.

In the numerous debates over nuclear power and over various specific alternative technologies, much of the attention given to alternatives focuses on forecasts of likely penetration into the market based on past trends. The most general question we address in this work is, "If we were to create a decentralized electrical energy system, how would it work?" As planners we concerned ourselves with only two general constraints: what is technologically possible (using existing knowledge and tools) and what is ecologically possible (considering existing conditions). Economic viability is something society creates after deciding what it wants, not something that should determine its needs. Making something economical is a policy problem. The question we need to ask is, "How do we do it?"—not "Should we?"

This outline of alternative methods for producing and distributing electricity clearly raises more questions than it answers, but we think it should be useful to anyone wanting to understand the options open to society. We hope it will